



National Nuclear Security Administration

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Albuquerque, New Mexico 87185-5400



AUG 1 0 2007

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. James Bearzi
Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road, Bldg. E
Santa Fe, New Mexico 87505



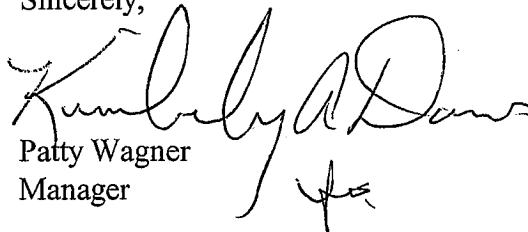
Dear Mr. Bearzi:

On behalf of Sandia Corporation and the Department of Energy (DOE), DOE is submitting a Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan; Decommissioning of Groundwater Monitoring Wells MWL-MW1 and MWL-MW3; Installation of Replacement Groundwater Monitoring Wells MWL-MW7 and MWL-MW8. This Plug and Abandonment Plan is required under Section VIII.C of the Compliance Order of Consent.

For efficiency and cost savings, we have scheduled this work to coincide with other field work scheduled for late summer. We would appreciate your review of the enclosed documents as soon as possible.

If you have any questions regarding this submittal, please contact me at (505) 845-6036, or Dan Pellegrino of my staff at (505) 845-5398.

Sincerely,


Patty Wagner
Manager

Enclosures (2)

cc w/enclosures:

W. Moats, NMED-HWB (Via Certified Mail)
L. King, EPA, Region 6 (Via Certified Mail)
T. Skibitski, NMED-OB

James Bearzi

(2)

AUG 1 9 2007

cc w/o enclosures:

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T. Longo, HQ/GTN, NA-56

J. Estrada, SSO, MS 0184

CERTIFICATION STATEMENT FOR APPROVAL AND FINAL RELEASE OF DOCUMENTS

Document title: Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan; Decommissioning of Groundwater Monitoring Wells MWL-MW1 and MWL-MW3; Installation of Replacement Groundwater Monitoring Wells MWL-MW7 and MWL-MW8, July 2007

Document author: Mike Skelly, Dept. 6765

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

Signature: Francis B. Nimick
Francis B. Nimick
Deputy to the
Nuclear Energy and Global Security Technologies
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Operator

7/31/07
Date

and

Signature: Patty Wagner
Patty Wagner
Manager
U.S. Department of Energy
National Nuclear Security Administration
Sandia Site Office
Owner and Co-Operator

8/10/07
Date

**Monitoring Well Plug and Abandonment Plan
and
Replacement Well Construction Plan**

**Decommissioning of Groundwater Monitoring Wells
MWL-MW1 and MWL-MW3**

**Installation of Replacement Groundwater Monitoring Wells
MWL-MW7 and MWL-MW8**

**Environmental Restoration Project
Sandia National Laboratories, New Mexico**

Sandia is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly-owned subsidiary of Lockheed Martin Corporation, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Table of Contents

Documentation:	Page:
1 Project and Site Information	1
2 Regulatory Criteria	1
3 Existing Well Information	2
4 Plugging and Abandonment	3
4.1 Goal	5
4.2 Objective	5
4.3 Implementation	5
5 Monitoring Well Installation	5
5.1 Objective	6
5.2 Implementation	6
5.2.1 Borehole Drilling	6
5.2.2 Well Construction	7
5.2.3 Well Development	9
6 Equipment Decontamination	9
7 Health and Safety	9
8 Pre-field Activities	9
9 Mobilization and Site Setup	10
10 Reporting	10
10.1 Decommissioning Records	10
10.2 Well Installation Records	11
11 References	12
 Figures:	
Figure 1 Location of existing wells MWL-MW1 and MWL-MW3; and proposed wells MWL-MW7 and MWL-MW8	4
Figure 2 MWL-MW1 Groundwater Elevations Over Time	8
Figure 3 MWL-MW3 Groundwater Elevations Over Time	8
 Tables:	
Table 1 Applicable Operating Procedures	3
 Attachments:	
Attachment 1--Monitoring Well Completion Diagram for MWL-MW1	
Attachment 2--Monitoring Well Completion Diagram for MWL-MW3	
Attachment 3--Groundwater Well Abandonment Diagram	
Attachment 4--Well Plug and Abandonment Form	
Attachment 5--Groundwater Monitoring Well Data Sheet	

1 Project and Site Information

Task Description: Sandia National Laboratories/New Mexico (SNL/NM)
decommissioning with plug and abandonment of two
groundwater monitoring wells, and installation of two replacement
groundwater monitoring wells

Case No.: 98026.01.08

Project Leader/Department No.: Paul Freshour/6765

Scheduled Start Date: September 2007

Estimated Completion Date: October 2007

Operations/Technical Area: Mixed Waste Landfill/Technical Area III

2 Regulatory Criteria

This Plug and Abandonment (P&A) Plan outlines the activities and procedures to decommission existing groundwater monitoring wells MWL-MW1 and MWL-MW3; with the installation of replacement groundwater monitoring wells MWL-MW7 and MWL-MW8.

In July 2007, the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) received a letter from the New Mexico Environment Department/Hazardous Waste Bureau (NMED/HWB) entitled "*Replacement of Mixed Waste Landfill Groundwater Monitoring Wells MWL-MW1 and MWL-MW3*" (NMED July 2007). In this letter the NMED requested that due to well construction issues, DOE/Sandia are required to replace these two groundwater monitoring wells. The letter also stated that DOE/Sandia shall submit to the NMED within 60 days a plan for approval describing how the wells are to be replaced and a schedule for implementation of this work. Section VIII.C of the Compliance Order on Consent (the Order) discusses well abandonment (NMED April 2004):

"Wells shall be abandoned when they are no longer required in the monitoring network, no longer provide representative groundwater samples because of falling water levels or insufficient productivity, or become damaged beyond repair. The goal of well abandonment is to seal the well in such a manner that it cannot act as a conduit for the migration of contaminants from either the ground surface to the saturated zone or between saturated zones. Respondents shall prepare an abandonment plan for any and all wells that are to be plugged and abandoned, and shall submit the plan to the Department for approval. Respondents shall not abandon any groundwater monitoring well without prior written approval of the Department."

Further regulatory requirements for well P&A procedures can be found in the New Mexico Office of the State Engineer (OSE) "Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells" (NM OSE August 2005):

"To plug a well, the entire well shall be filled from the bottom upwards to land surface using a tremie pipe. The well shall be plugged with neat cement slurry, bentonite based plugging material, or other sealing material approved by the state engineer for use in the plugging of non-artesian wells."

The OSE regulations also state that:

"Wells encountering contaminated water or soil may require coordination between the office of the state engineer and the New Mexico environment department (or other authorized agency or department) prior to the plugging of the well."

And,

"A licensed well driller shall keep a record of each well plugged as the work progresses. The well driller shall file a complete plugging record with the state engineer and the permit holder no later than twenty (20) days after completion of the plugging. The plugging record shall be on a form prescribed by the state engineer . . ."

To meet these regulatory requirements, the following tasks will be completed at SNL/NM:

- Decommission wells MWL-MW1 and MWL-MW3 because they no longer provide representative groundwater samples due to falling water levels and insufficient productivity, and/or due to corrosion of their stainless steel screens.
- Submit this P&A Plan to the NMED/HWB and OSE for review and approval.
- Use a licensed well driller and approved materials to seal the wells so that they cannot act as a conduit for the migration of potential contaminants from the ground surface to the saturated zone.
- Upon completion of the P&A activities, submit a plugging record to the OSE and submit a P&A Report describing the field activities to the NMED/HWB.

3 Existing Well Information

Groundwater monitoring wells MWL-MW1 and MWL-MW3 are proposed for decommissioning in this P&A Plan. The monitoring well completion diagrams are presented in Attachments 1 and 2, and the pertinent well completion information is summarized below.

MWL-MW1 is a groundwater monitoring well located at the Mixed Waste Landfill (Figure 1). This well was installed in October 1988 and is completed in the regional aquifer with the following well completion details:

- Total depth of the well – 478 feet (ft) below ground surface (bgs).
- Screened interval – 456 to 476 ft bgs.
- Construction materials – Polyvinyl chloride (PVC) riser pipe, stainless steel screen, carbon steel protective surface casing and guard posts, and a concrete well pad.
- Current water level – approximately 465 ft bgs.
- Water-bearing strata – Groundwater occurs in unconsolidated silts and sands (alluvial fan facies) of the upper Santa Fe Group that have relatively low hydraulic conductivities.
- Reason for decommissioning – The stainless-steel screen is corroding and the well requires excessive time to recover between purging and sampling. There is no evidence that suggests the annular seal is compromised.

MWL-MW3 is a groundwater monitoring well located at the Mixed Waste Landfill (Figure 1). This well was installed in August 1989 and is completed in the regional aquifer with the following well completion details:

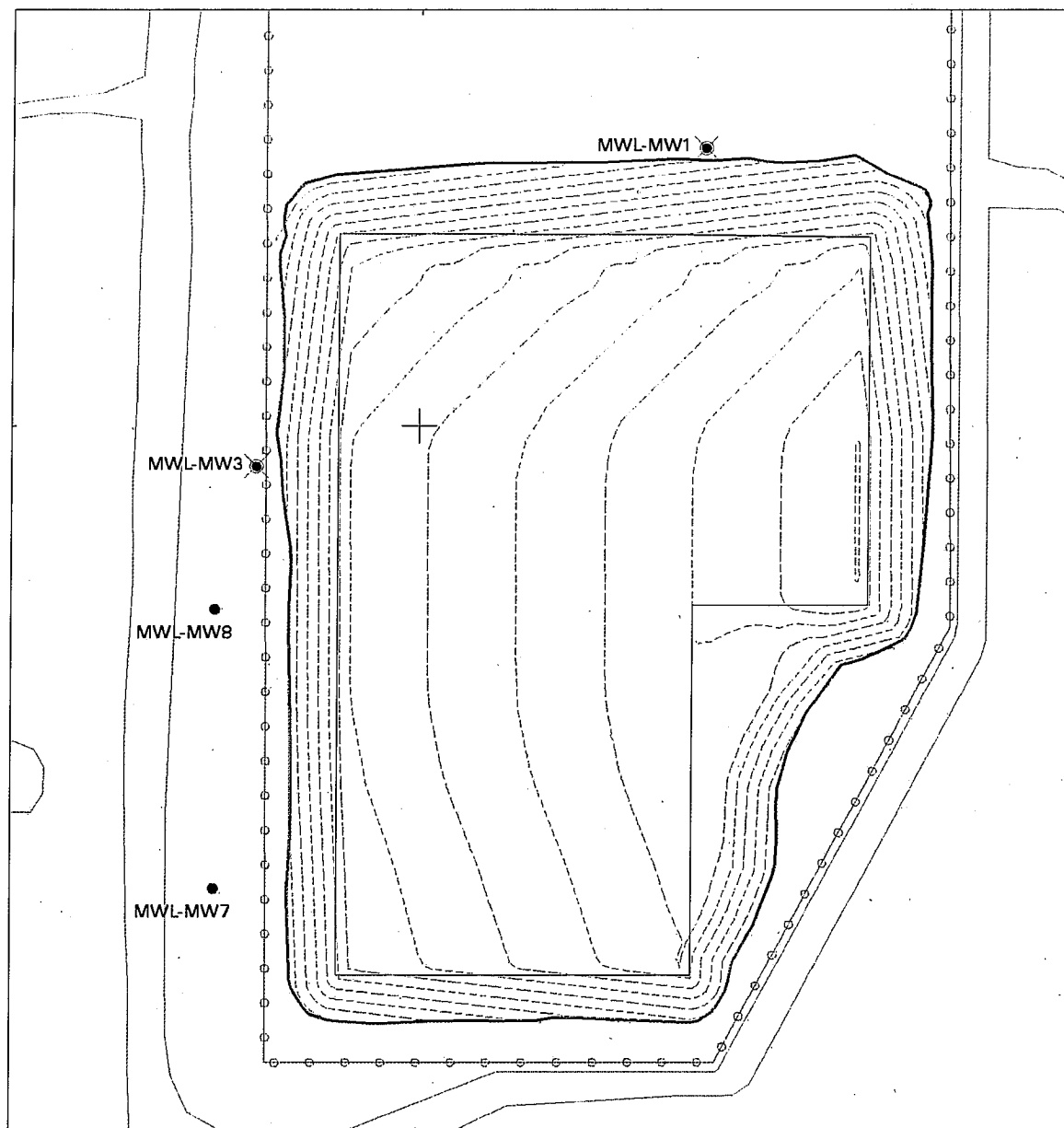
- Total depth of the well – 476 feet (ft) below ground surface (bgs).
- Screened interval – 451 to 471 ft bgs.
- Construction materials – Polyvinyl chloride (PVC) riser pipe, stainless steel screen, carbon steel protective surface casing and guard posts, and a concrete well pad.
- Current water level – approximately 468 ft bgs.
- Water-bearing strata – Groundwater occurs in unconsolidated silts and sands (alluvial fan facies) of the upper Santa Fe Group that have relatively low hydraulic conductivities.
- Reason for decommissioning – The regional water table has dropped to the lowest portion of the screened interval and the well requires excessive time to recover between purging and sampling. Also, the stainless-steel screen is corroding. There is no evidence that suggests the annular seal is compromised.

4 Plugging and Abandonment

Based on the requirements established by the NMED/HWB and OSE, the groundwater monitoring wells MWL-MW1 and MWL-MW3 will be decommissioned. Applicable Field Operating Procedures (FOPs) and Administrative Operating Procedures (AOPs) are listed in Table 1; however, this site-specific P&A Plan should be used as the primary guidance in the field.

Table 1. Applicable Operating Procedures

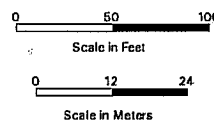
Number of Procedure	Title of Procedure
FOP 94-01	Safety Meetings, Inspections, and Pre-Entry Briefings Rev. 1, 12/16/96
FOP 94-05	Borehole Lithologic Logging, Rev. 0, 2/10/94
FOP 94-25	Documentation of Field Activities, Rev. 0, 11/4/94
FOP 94-26	General Equipment Decontamination, Rev. 1, 2/20/97
FOP 94-28	Health and Safety Monitoring of Organic Vapors (FID and PID), Rev. 2, 4/27/97
FOP 94-38	Drilling Methods and Drill Site Management, Rev. 0, 4/14/94
FOP 94-41	Well Development, Rev. 0, 11/21/94
FOP 94-42	Integration of the design, Installation, Rehabilitation, and Decommissioning of Environmental Restoration Wells, Rev. 1, 5/31/94
FOP 94-43	Decommissioning Of Wells, Rev 0, 5/31/94
FOP 94-45	Designing and Installing Groundwater Monitoring Wells, Rev. 0, 5/31/94
FOP 94-57	Decontaminating Drilling and Other Field Equipment, Rev. 0, 5/31/94
FOP 94-68	Field Change Control, Rev. 2 (in revision)
FOP 94-69	Personnel Decontamination (Level D, C, and B Protection), Rev. 1, 1/23/98
AOP 94-24	System and Performance Audits, Rev. 0, 1/12/95
AOP 94-25	Deficiency Reporting, Rev. 0, 1/12/95
AOP 95-16	Administrative Operating Procedure for Sample Management and Custody, Rev. 1, 4/18/96



Legend

- Existing Groundwater Monitoring Well Proposed for Plug and Abandonment
- Replacement Groundwater Monitoring Well (location shown schematically)
- Proposed Toe of MWL Cover
- Road
- 1-ft. Contour Intervals for Proposed MWL Soil Cover
- Proposed MWL Fence
- Former MWL Boundary

Figure 1
Location of MWL-MW1,
MWL-MW3; and Proposed Wells
MWL-MW7 and MWL-MW8



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

4.1 Goal

The goal for decommissioning monitoring wells MWL-MW1 and MWL-MW3 is to eliminate the potential of these wells to act as conduits for the migration of potential contamination to groundwater. The well materials and annular seals are not believed to pose a threat to groundwater, and therefore will be backfilled in place with proper sealing materials.

4.2 Objective

The objective is to seal these monitoring wells in such a manner that there is reasonable certainty that the abandonment has adequately eliminated the potential for cross-communication between the land surface and the aquifer, and the potential for downward migration of potential contaminants through the borehole annulus to the aquifer. All grouting techniques and grout mixtures used during decommissioning will minimize grout intrusion into the native formation.

4.3 Implementation

General activities for the implementation of the P&A include:

- 1) Remove all monitoring well surface completion features,
- 2) Backfill the casings with well-plugging materials, and
- 3) Construct new surface pad/monuments.

SNL/NM personnel and the selected drilling contractor will remove all surface completion features, such as guard posts, concrete well pads, and surface protective casing. Care will be taken to prevent materials from falling down the well casing and possibly causing a downhole obstruction. The wells will be abandoned with casing left in place, and each well casing will be cut off at approximately 5 ft bgs.

For each well, the well screen and blank well casing will be sealed by lowering a tremie pipe to the base of the well casing (below the base of the screen) and injecting the plug material (bentonite grout) using a diaphragm or equivalent pump system. The plug material will be filled to within 5 ft of the ground surface and allowed to set overnight. If the level of the plug material in the well casing drops overnight, additional bentonite grout will be added to again reach within 5 ft of ground level.

Once the wells have been properly plugged, the decommissioning process will be completed by placing concrete in the upper 5 ft of the well/borehole and installing concrete slabs on the surface. The concrete pads will be 4 inches thick with a 2 ft by 2 ft area, constructed in the ground so that the surface of the finished concrete slab will be 1 to 2 inches above the natural ground surface. A brass marker containing the well name and date of decommissioning will be set in each of the concrete pads.

5 Monitoring Well Installation

Two replacement monitoring wells (MWL-MW7 and MWL-MW8) will be installed after MWL-MW1 and MWL-MW3 have been decommissioned.

5.1 Objective

Install two 5-inch nominal diameter PVC casing replacement monitoring wells to provide representative groundwater samples. The replacement monitoring well boreholes will be drilled using Air-Rotary Casing-Hammer (ARCH) drilling methods.

Based on the July 2007 letter from the NMED/HWB (NMED July 2007) the replacement wells shall be installed at locations as close as possible to the western boundary of the landfill, taking into account the footprint of the future landfill cover. The new well locations were selected for use during long-term monitoring of the groundwater. To meet this request, MWL-MW7 will be installed at a location approximately 520 ft southwest of MWL-MW1, and MWL-MW8 will be installed at a location approximately 90 ft south of MWL-MW3 (Figure 1). The proposed replacement well locations on Figure 1 are shown schematically; the actual location of each may vary due to utility clearance and land use issues.

5.2 Implementation

Applicable FOPs and AOPs are listed in Table 1; however, this site-specific plan should be used as the primary guidance in the field.

5.2.1 Borehole Drilling

The ARCH drilling method will use environmentally-friendly lubricants and will be able to penetrate highly variable lithologies such as cobbles, boulders, gravel, sand, clay, and caliche while maintaining an open, competent borehole. The geology of the borehole will be logged during drilling. The total depth of the borehole will be determined by the SNL/NM field geologist, but the depths are anticipated to be 30 to 35 ft deeper than the original well. The depth of the first encounter with regional groundwater and any perched groundwater will be logged during drilling. After reaching total depth, the cased borehole will be logged using natural gamma and neutron wire-line geophysical methods.

Minimal water (but no other foams/liquids) in the form of "mist" may be introduced into the borehole to aid in the removal of cuttings. Waste generation will be kept to a minimum. Borehole cuttings will be contained within an area adjacent to the well. Water produced from the well during drilling or development will be contained in 55-gallon drums and placed on spill control pallets.

Based on the most recent groundwater level measurements for the MWL Study Area (April 2007), monitoring well MWL-MW7 is anticipated to be drilled to approximately 495 ft bgs. The 30-ft well screen for MWL-MW7 will be set with approximately 5 ft of screen situated above the static water level. The anticipated depth to water at this location is approximately 465 ft bgs; therefore, the screen completion interval is expected to be approximately 460 to 490 ft bgs with a 5-ft sump placed below the screen.

Monitoring well MWL-MW8 is anticipated to be drilled to approximately 497 ft bgs. The 30-ft well screen for MWL-MW8 will be set with approximately 5 ft of screen situated above the static water level. The anticipated depth to water at this location is approximately 467 ft bgs; therefore, the screen completion interval is expected to be approximately 462 to 492 ft bgs with a 5-ft sump placed below the screen.

5.2.2 Well Construction

The monitoring wells will be completed as specified in this plan. The water-table monitoring wells will be installed through the temporary steel drive casing (nominal 10-inch diameter), and completed using 5-inch nominal diameter, flush threaded, PVC Schedule-80 water well casing. No solvents, cleaners, or lubricants will be used for construction of the monitoring well. The casing will be delivered pre-cleaned and bagged, or steam-cleaned on site prior to installation. To preserve the integrity of the well materials, the well screen and riser pipe will be suspended in the borehole until the primary filter pack, bentonite pellet seal and annular seal are installed.

The regional aquifer in the area is being over-pumped and the water table at MWL-MW1 and MWL-MW3 is rapidly declining with a decline rate of approximately 0.5 to 1.5 ft/year, respectively, over the last several years (Figures 2 and 3). To accommodate the rapidly declining water table, a 30-ft length of PVC screen with a 0.010-inch or 0.020-inch slot size will be used for the replacement wells. A 5-ft sump will be placed at the base of the screen and sealed with a threaded end cap. PVC centralizers will be placed at the base and top of the well screen and then at intervals not to exceed 100 ft up to the land surface. The screen for these water-table wells will be placed so that the top of the screens are approximately 5 ft above the static water level.

The appropriate screen slot size and gradation of the filter pack material will be based on the gradation of the sediments in the screen interval as determined in the field by the geologist logging the borehole. If the predominant water-bearing interval consists mostly of clay and silt, a 0.010-inch screen slot and a primary filter pack of clean 20-40 silica sand will be placed in the annulus. However, if the predominant water-bearing interval consists mostly of silt and sand, a 0.020-inch screen slot and a primary filter pack of clean 10-20 silica will be placed in the annulus. The primary filter pack will extend from the bottom of the sump to at least 5 ft above the top of the screen. A 5-ft thick layer of clean 40-60 sand will be placed above the primary filter pack. Both sand packs will be tagged using a tag line to verify their depth. Preliminary well development using a surge block will be performed at this time to help settle the filter pack.

A 10-ft thick layer of 1/4-inch bentonite pellets or 3/8-inch bentonite chips will be placed above the filter pack prior to emplacement of the bentonite-grout annular seal. Each 5-ft thickness of bentonite pellets/chips added will be hydrated before adding the next 5-ft thickness of bentonite pellets/chips. The final lift of bentonite pellets/chips will be allowed to set for a time adequate for hydration (at least 1 hour). The remaining annular space to ground surface will then be filled with bentonite grout. To prevent overloading, the bentonite grout will be installed in multiple lifts. Per NMED requirements (NMED June 2007; SNL/NM in preparation), the first bentonite grout lift will be approximately 100 ft thick and will be allowed to set a minimum of 24 hours before installation of the next lift. Subsequent bentonite grout lifts will each be approximately 200 ft thick. The bentonite grout will be topped off to within 6-inches to 1-ft bgs.

The well casing will extend approximately 30 inches above ground surface with a water-tight cap. The monitoring well will be completed with protective steel casing with a hinged locking cap. The protective casing will be primed and painted yellow. A 3-ft by 3-ft, sloped concrete

Figure 2 MWL-MW1 Groundwater Elevations Over Time

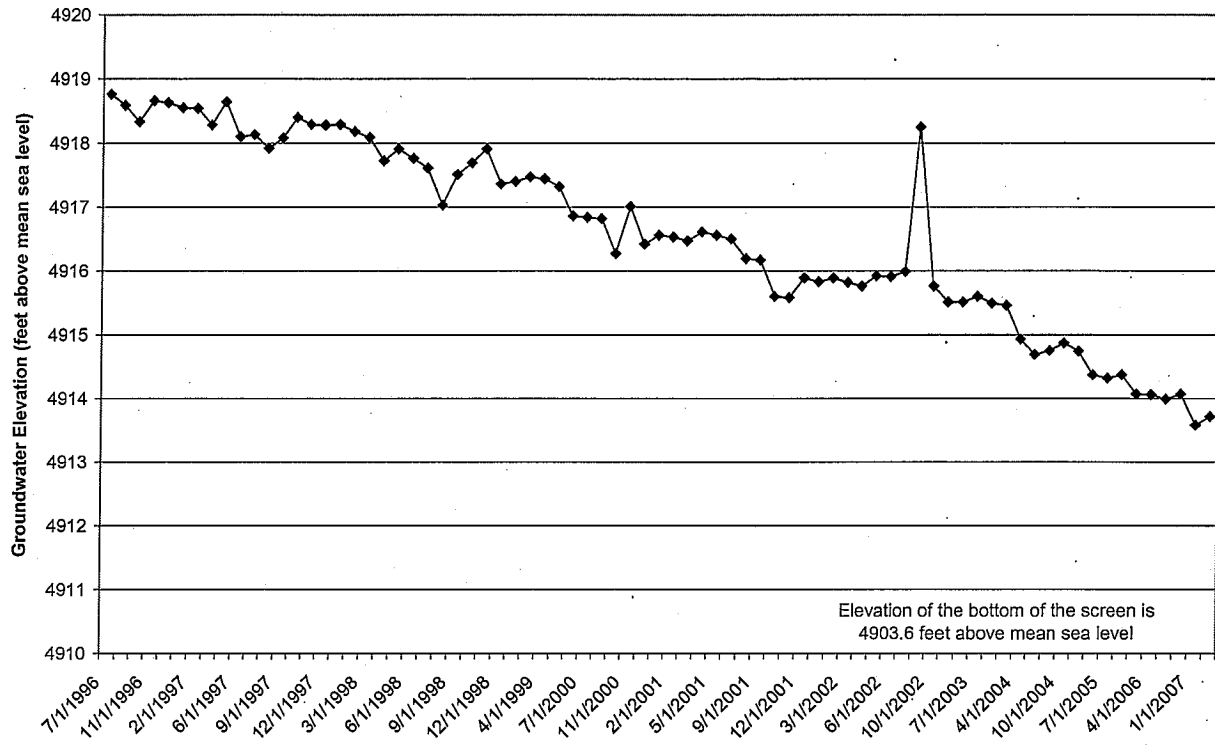
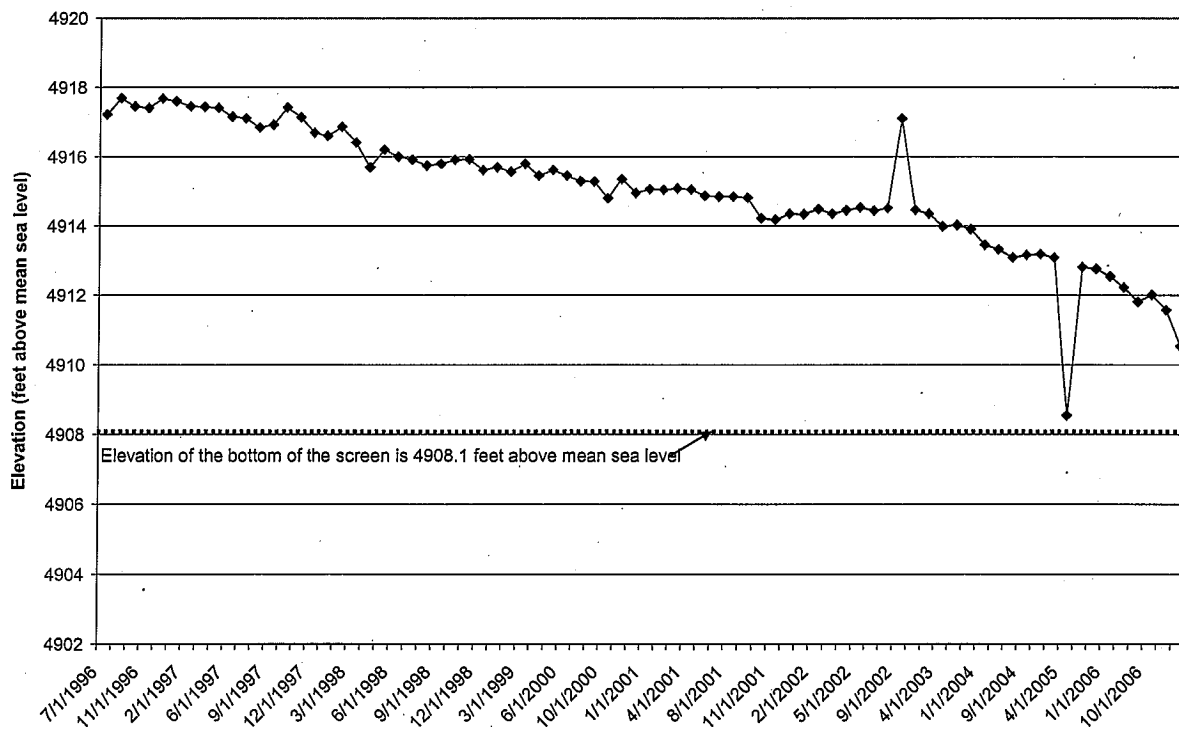


Figure 3 MWL-MW3 Groundwater Elevations Over Time



pad will be constructed around the casing. The pad will contain a 3-in brass cap stamped with the well identification. Three, 4-inch diameter concrete-filled, steel guard posts (also primed and painted yellow) will be placed around the pad, equidistant from the well.

5.2.3 Well Development

Well development will be initiated at least 48 hours after grouting. Each well will be developed for approximately 10 hours, and will consist of pumping, surge-block, swabbing, and/or bailing techniques. During development, the groundwater field parameters (pH, specific conductivity, temperature, and turbidity) will be continuously monitored, and development will continue until parameters have stabilized. All development water will be contained in drums and will not be allowed to discharge to the ground surface. The method of development, the volume of water added or removed, the parameters measured, the results of the measurements, and the time these activities take place will be documented in writing during well development. If required, only potable water shall be added to the wells during development.

During development of these water-table completion wells, a minimum of five well bore volumes will be removed. After the minimum volume has been removed, development will continue until representative water is obtained. Representative water is assumed to be obtained when pH, temperature, turbidity, and specific conductivity readings stabilize (less than 10% variability over three consecutive well bore volumes) and the water is visually clear of suspended solids with a target turbidity of less than five Nephelometric Turbidity Units (NTUs).

6 Equipment Decontamination

The drilling rig and related equipment will be decontaminated at the decontamination pad in Technical Area III prior to the beginning of drilling operations and between well locations. Decontamination of equipment will also be required after completing the well. Decontamination waste will be kept to a minimum and containerized in drums placed on spill control pallets at the decontamination pad.

7 Health and Safety

Level D personal protective equipment is required for all drilling operations. Health and Safety records associated with drilling and development personnel will be maintained on site and will be available at the commencement of drilling activities. All field personnel will operate under an SNL/NM Health and Safety Plan (HASP) and will have SNL/NM-required training including 40-Hr OSHA HAZWOPER and subsequent yearly refresher courses. An SNL/NM Subject Matter Expert will perform a safety inspection of the drill rig before drilling commences.

8 Pre-field activities

Pre-field activities that must be completed prior to drilling include:

- Preparation of the Statement of Work for drilling and monitoring well installation;
- SNL/NM digging permit request and approval;
- HASP preparation, review, and signatures;
- National Environmental Policy Act (NEPA) review and signatures;
- Sample bottle order for waste samples through Sample Management Office;
- Waste Management Plan preparation;
- Field checklist completion, review, and approval; and
- Readiness review meeting.

9 Mobilization and Site Setup

SNL/NM personnel will ensure that containers for cuttings have been obtained and are ready for drilling operations. Roll-off bins supplied by SNL/NM will be used to collect drill cuttings for waste management purposes.

10 Reporting

Based on the requirements established by the NMED/HWB, OSE and SNL/NM FOPs, the field activities associated with decommissioning and installation of the monitoring wells will be documented.

10.1 Decommissioning Records

All decommissioning field activities will be documented in a field log book per guidance in FOP 94-25. Upon completion of decommissioning of the wells, the P&A Report will document all site activities and provide final as-built well decommissioning diagram (Attachment 3). Attachment 4 will be used to assure that all records are completed, approved, and submitted for proper records management. The following list of documents and records that are generated as part of the decommissioning process will be provided to the SNL/NM Well File Coordinator who, in turn, will submit them to the SNL/NM Customer-Funded Records Center:

- Monitoring Well Plugging and Abandonment Request
- Well Plugging and Abandonment Form
- Site-Specific Well Plugging and Abandonment Work Plan
- Site-Specific Well Plugging and Abandonment Report
- Plugging and Abandonment Documentation and Approval Checklist
- Waste Management Plan
- Field Log Book
- Detailed as-built diagram (Attachment 3)

All decommissioning activities performed at SNL/NM will be accurately and concisely documented in a final P&A Report to be submitted to the NMED/HWB and the OSE. The P&A Report will contain a brief narrative describing actual work performed at the site and any variances to the site-specific P&A Plan. Information to be contained in the P&A Report include: (1) daily field activity notes, (2) all materials used, (3) a final "as-built" plugging and abandonment diagram, and (4) documentation of notification of SNL/NM GIS group and the appropriate regulatory agencies. The Well Plugging and Abandonment Form (Attachment 3) will be completed and included as part of the P&A Report.

Further P&A reporting elements are required by the OSE (OSE August 2005). SNL/NM personnel and the licensed well driller (contractor) will submit a plugging record with the state engineer no later than twenty (20) days after completion of the plugging. The record will include the following elements:

- Name and address of the well owner
- Well driller's name and license number
- Name of each drill rig supervisor that supervised the well plugging
- State engineer file number for the well (if available)
- Location of the well (reported in New Mexico state plane coordinates to ± 0.01 ft)
- Dates when plugging began/concluded
- Plugging material(s) used
- Depth of the well
- Size and type of casing
- Location of perforations
- Location of the sanitary seal
- Completed well log with depth and thickness of all strata plugged, including whether each stratum was water bearing

10.2 Well Installation Records

All well installation field activities will be documented in a field log book per guidance in FOP 94-45. Upon completion of the well installation, the Field Report will document all site activities and provide final as-built well completion diagrams (Attachment 5). The Field Report will contain a brief narrative describing actual work performed at the site and any variances to the site-specific Well Installation Plan. Information to be contained in the Field Report include: (1) daily field activity notes, (2) all materials used, (3) a final "as-built" well completion diagram, and (4) documentation of notification of SNL/NM GIS group and the appropriate regulatory agencies. The documentation will also include the 37 information elements required in Section VIII.D of the Order (NMED April 2004). The following list of documents and records that are generated as part of the well installation process will be provided to the SNL/NM Well File Coordinator who, in turn, will submit them to the SNL/NM Customer-Funded Records Center:

- Well permit agreement
- Well file contents checklist
- Well data summary sheet
- Statement of work for drilling the well
- Drilling permit
- Lithologic (boring) log
- Well construction diagram and completion parameters
- Well development data and groundwater parameters
- Copies of field logbook (geologist, driller)
- Surveyed elevations and location in New Mexico state plane coordinates (with a degree of accuracy of ± 0.01 ft)
- Location map
- Water level measurements
- Aquifer test data
- Analytical data

- Waste management documentation
- Photographs

11 References

New Mexico Environment Department (NMED) April 2004, "Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order," New Mexico Environment Department, April 24, 2004.

New Mexico Environment Department (NMED) June 2007, "Notice of Disapproval: Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan, Decommissioning of Groundwater Monitoring Well MWL-BW1, Installation of Replacement Groundwater Monitoring Well MWL-BW2, April 9, 2007, Sandia National Laboratories NM5890110518, HWB-SNL-07-014." Letter to Patty Wagner (SSO/NNSA) and Francis Nimick (Sandia) from James Bearzi, June 19, 2007

New Mexico Environment Department (NMED) July 2007, "Replacement of Mixed Waste Landfill Groundwater Monitoring Wells MWL-MW1 and MWL-MW3, Sandia National Laboratories, EPA ID NM5890110518" Letter to Patty Wagner (SSO/NNSA) and Francis Nimick (Sandia) from James Bearzi, July 2, 2007.

OSE August 2005, "Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells" New Mexico Office of the State Engineer, August 2005.

Sandia National Laboratories, New Mexico (SNL/NM), in preparation "Response to Notice of Disapproval: Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan, Decommissioning of Groundwater Monitoring Well MWL-BW1, Installation of Replacement Groundwater Monitoring Well MWL-BW2", and Revised Plan, Sandia National Laboratories Environmental Restoration Project.

Attachment 1

Monitoring Well Completion Diagram for MWL-MW1

WELL DATABASE SUMMARY SHEET

Project Name:	MIXED WASTE LANDFILL	Geo Location:	MIXED WASTE LANDFILL
ER ADS #:	1289	Well Completion Date:	01-OCT-1988
Well Name:	MWL-MW1	Completion Zone:	SILTY SAND
Owner Name:	SNL/NM	Formation of Completion:	SANTA FE GROUP
Date Drilling Started:	28-SEP-1988	Well Comment:	BOREHOLE DIAM IS 14" TO 200' - 10" TO 478.67 - WATER LEV ELEV 8/16/90
Drilling Contractor:	WATER DEVELOPMENT		
Drilling Method:	AIR ROTARY CASING HAMMER		
Borehole Depth:	478.67		
Casing Depth:	478		

Survey Data

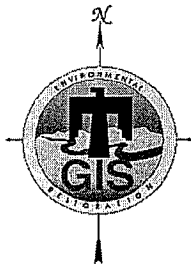
Survey Date: 01-JAN-1990
 Surveyed By: SANTIAGO ROMERO AND ASSOCIATES

State Plane Coordinates

(X) Easting: 411661.747
 (Y) Northing: 1452661.099

Surveyed Elevations (FAMSL)

Protective Casing: 5382.2
 Top of Inner Well Casing: 5381.54
 Concrete Pad: 5379.56
 Ground Surface: 5379.12

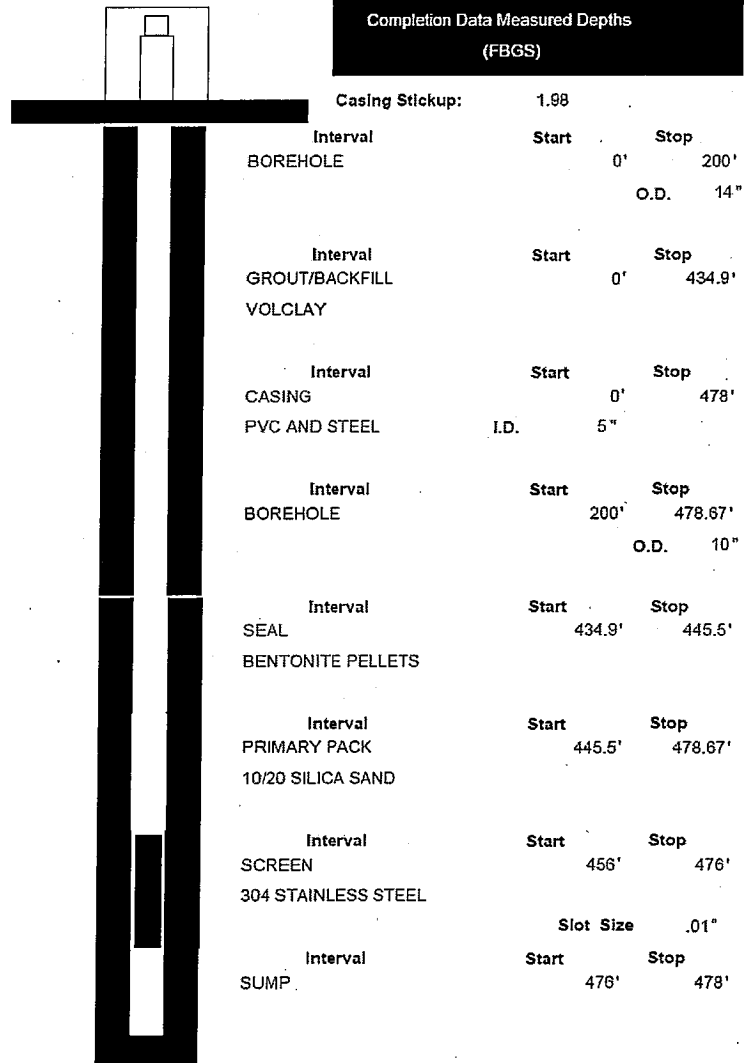


Calculated Depths and Elevations

Initial Water Elevation:
 (FAMSL) 4923.36
 Initial Depth To Water:
 (FBGS) 458.18

Last measured water level was measured on 12-APR-2007 FASL

Date Updated: 29-AUG-2006
 Date Printed: 10-JUL-2007



Attachment 2

Monitoring Well Completion Diagram for MWL-MW3

WELL DATABASE SUMMARY SHEET

Project Name:	MIXED WASTE LANDFILL	Geo Location:	TA-III
ER ADS #:	1289	Well Completion Date:	22-AUG-1989
Well Name:	MWL-MW3	Completion Zone:	SAND
Owner Name:	SNL/NM	Formation of Completion:	SANTA FE
Date Drilling Started:	20-AUG-1989	Well Comment:	BOREHOLE TD AT 501', BACKFILL WITH .4 BENTONITE/CEMENT PLUG TO 478' ABOUT 1' OF 16/40 FN SIL SAND AT TOP OF FILTER PACK
Drilling Contractor:	STEWART BROTHERS		
Drilling Method:	MUD ROTARY		
Borehole Depth:	501		
Casing Depth:	476.3		

Survey Data

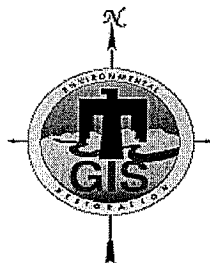
Survey Date: 16-AUG-1990
 Surveyed By: SANTIAGO ROMERO AND ASSOCIATES

State Plane Coordinates

(X) Easting: 411407.995
 (Y) Northing: 1452476.617

Surveyed Elevations (FAMSL)

Protective Casing: 5381.78
 Top of Inner Well Casing: 5381.32
 Concrete Pad: 5379.41
 Ground Surface: 5378.97



Calculated Depths and Elevations

Initial Water Elevation: 4921.1
 (FAMSL)
 Initial Depth To Water: 460.22
 (FBGS)

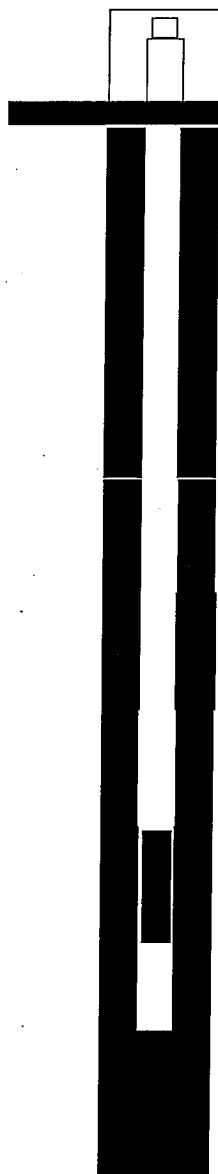
Last measured water level was
 measured on 26-APR-2007

FASL

Date Updated: 14-MAR-00
 Date Printed: 10-JUL-2007

Completion Data Measured Depths (FBGS)

Casing Stickup:	1.91		
Interval	Start	Stop	
GROUT/BACKFILL	0'	429'	
CEMENT/BENTONITE			
Interval	Start	Stop	
CASING	0'	478.8'	
PVC/METAL		O.D. 5"	
Interval	Start	Stop	
BOREHOLE	0'	501'	
		O.D. 12.25"	
Interval	Start	Stop	
SEAL	429'	444'	
BENTONITE			
Interval	Start	Stop	
SECONDARY PACK	444'	446'	
16/40			
Interval	Start	Stop	
PRIMARY PACK	446'	476'	
10/20			
Interval	Start	Stop	
SCREEN	451.3'	471.3'	
STAINLESS STEEL			
	Slot Size	.01"	
Interval	Start	Stop	
SUMP	471.3'	476.3'	
Interval	Start	Stop	
PLUG BACK	476.3'	501'	
BENTONITE			



Attachment 3

Groundwater Well Abandonment Diagram

SNL/NM ER PROJECT
GROUNDWATER MONITORING WELL ABANDONMENT DIAGRAM

**Wells Decommissioned
in Place**

**Wells Decommissioned
through Casing Removal**

Not to Scale

WELL NAME _____

LOCATION DESCRIPTIVE _____

STATE PLANE COORDINATE X: _____

Y: _____

SURFACE CASING TYPE _____

SURFACE CASING LENGTH _____

I.D. OF WELL CASING _____

WELL CASING DEPTH _____

SCREEN INTERVAL _____

PLUGGING GROUT TYPE _____

GROUT VOLUME USED _____

DEPTH LIFT 1 _____

DEPTH LIFT 2 _____

DEPTH LIFT 3 _____

DATE OF DECOMMISSIONING _____

WELL NAME _____

LOCATION DESCRIPTIVE _____

STATE PLANE COORDINATE X: _____

Y: _____

CASING REMOVAL METHOD _____

FINAL HOLE DIAMETER _____

FINAL HOLE TOTAL DEPTH _____

PLUGGING GROUT TYPE _____

GROUT VOLUME USED _____

DEPTH LIFT 1 _____

DEPTH LIFT 2 _____

DEPTH LIFT 3 _____

DATE OF DECOMMISSIONING _____

Attachment 4

Well Plug and Abandonment Form

SNL/NM ER PROJECT WELL PLUGGING AND ABANDONMENT FORM

Page 1 of 1

1. Preabandonment Well Specifics:

- a. Well Identification _____
- b. Location (geographic description
and state plane coordinates) _____
- c. Reported Well Depth (feet) _____
- d. Field Well Depth (feet) _____
- e. Screened Intervals(s) (feet) _____
- f. Screen Diameter(s) (inches) _____
- g. Screen Type(s) (SS or PVC, etc.) _____
- h. Casing Diameter(s) (inches) _____
- i. Casing Type (PVC, steel, etc.) _____
- j. Artesian or Nonartesian Aquifer _____

2. Reason for Abandonment:

3. Abandonment Specifics:

- a. Date Abandonment Started _____
- b. Date Abandonment Completed _____
- c. ID Number of Field Log Book Used _____
- d. Site Personnel _____
- e. Drilling Method Used _____
- f. Grout Used _____
- g. Casing Removed (Y or N) _____
- h. Concrete Pad Inscription _____

j. Briefly Describe Abandonment Method:

k. Disposition of Materials Removed From Well: _____

4. Comments or Problems Encountered: _____

Completed by: _____

Printed Name

Signature


Date

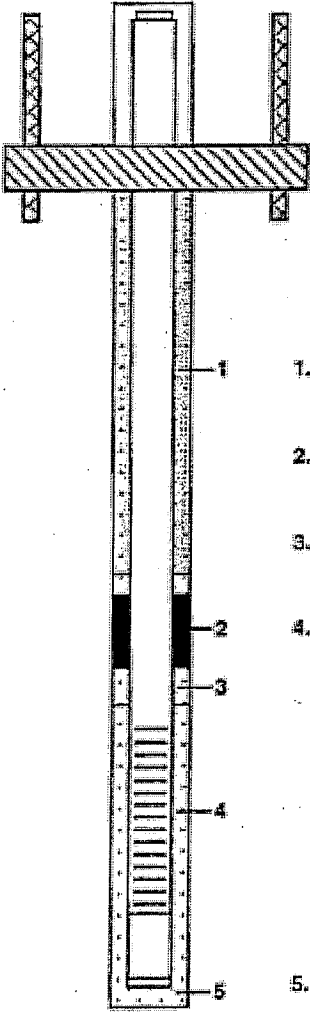
Subcontractor: _____

Drilling Contractor: _____ License No.: _____

Attachment 5

Groundwater Monitoring Well Data Sheet

SNL/NM Groundwater Monitoring Well Data Sheet	
PROJECT NAME: _____ ER ADS #: _____ WELL NAME: _____ OWNER: _____ DATE DRILLING BEGAN: _____ DRILLING CONTRACTOR: _____ DRILLING METHOD: _____ BOREHOLE DEPTH: _____ BOREHOLE DIAMETERS: _____	GEOGRAPHIC LOCATION: _____ WELL COMPLETION DATE: _____ COMPLETION ZONE: _____ FORMATION OF COMPLETION: _____ REMARKS: _____ <div style="text-align: right; padding-top: 20px;">  </div>

Survey Data	Completion Data	
Survey Date: _____ Surveyed by: _____ State Plane Coordinates (X) Easting = _____ (Y) Northing = _____ Surveyed Elevations (feet above sea level) Protective Casing: _____ (Elev. D - FOP 94-71) Top of Inner Well Casing: _____ (Elev. C - FOP 94-71) Concrete Pad: _____ (Elev. B - FOP 94-71) Ground Surface: _____ (Elev. A - FOP 94-71) Calculated Elevations (feet above sea level) Initial Water Level: _____ Other: _____ Comments: _____ Form Completed by: _____ Verified by: _____	Measured Depths (feet below ground surface) Initial Water Level: _____ Casing Stickup: _____ (above ground level) Casing OD (in.): _____ Casing ID (in.): _____ 1. Grout/Backfill Interval: _____ Material: _____ 2. Seal Interval: _____ Material: _____ 3. Secondary Pack Interval: _____ Secondary Pack Size: _____ 4. Primary Pack Interval: _____ Primary Pack Size: _____ Screen Interval: _____ Slot Size: _____ Material: _____ Sump Length: _____ Casing Depth: _____ Material: _____ 5. Plug Back Interval (if used): _____ (Casing TD-Hole TD) _____ Plug Material (if used): _____	

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